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ABSTRACT

This is one of twenty course guides in the Community Living Skills Guide for the College for Living series which provides guidelines and workbook activities for the course, Beginning Woodworking, Use of Basic Hand Tools and Shop Safety. The series of courses for developmentally disabled adults is intended to supplement residential programs and to aid in orienting institutionalized persons to eventual integration into the community. This course of study focuses on safe and proper use of hand tools and shop safety, with an introduction to mass production techniques. It is intended to help the students develop safe working practices, skills necessary to use hand tools, an interest and appreciation for woodworking, a knowledge of leisure time activities in woodworking, and an awareness of job opportunities in woodworking. The course is based on this four step outline: (1) orientation and pre-test (making a breadboard), (2) making a mirrored wall shelf and book/record rack, (3) introduction to mass production techniques in industry, and (4) a personal project. These materials are provided for each step: terminal and performance objectives, homework assignments, plans of procedures for the projects, and suggested activities. A sample twelve-week syllabus and course outline are provided. Other guides in the series and related documents (a volunteer training workshop packet and curriculum guide for fourteen courses) are available separately. (See note.) (YLB)

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COMMUNITY LIVING SKILLS GUIDE

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BEGINNING WOODWORKING

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THE COLLEGE FOR LIVING
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BEGINNING WOODWORKING
USE OF BASIC HAND TOOLS AND
SHOP SAFETY

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INTRODUCTION

This is a course of study in Beginning Woodworking that will focus on the safe and proper use of hand tools and shop safety, with an introduction to mass production techniques. This course has been designed for developmentally disabled adults who are attending Metropolitan State College College for Living.

The course is intended to help the students develop safe working practices, skills necessary to use hand tools, an interest and appreciation for woodworking, a knowledge of leisure time activities in woodworking, and an awareness of job opportunities in woodworking. In addition the course has been structured to develop confidence and pride in the students and to improve socialization skills by having the students helping each other.

Abstract

This course has been divided into four different steps. Step I of the course includes an orientation in which the students and teachers will introduce themselves to each other. Following the introduction the students will be shown around the shop to acquaint them with the shop layout. Following this the students will take part in a discussion to discuss the importance of the safety rules they must follow while in the shop. The discussion will be guided by the instructors.

Step I is designed as a pre-test to determine the students' psycho-motor abilities. This project was also designed to build up the students' confidence and pride in themselves. Jigs will be set up and the students will be guided through a step-by-step procedure that will enable them to start and successfully complete a breadboard the first night of class. The students will also be introduced to the following hand tools and their uses: backsaw, mallet, and vise. The project will be finished with a non-toxic vegetable oil finish.

In Step II of the course the students will construct a mirrored wall shelf. This task will introduce the students to the proper use of the following hand tools; metric rules, crosscut saw, rip saw, jack plane, files and rasps, screwdrivers, coping saw, wood chisel, hand drill and bits, wood clamps and squares. The students will receive instruction on metric measuring while laying out the project.

While constructing the mirrored wall shelves the students will learn proper sanding procedures and receive instructions on the safe and proper use of portable power sanders. The student will learn how to glue and clamp projects together and how to apply a finish using stains and lacquer.

Step III of the course will be an introduction to mass production techniques used in industry. This step of the program will enable the students to work together to complete a manufacturing project. The students will become acquainted with the process used in manufacturing a product by mass producing wheelchair trays for the Ridge State Home and Training School which have been designed to meet special needs. During this step of the program a field trip has been planned to introduce the students to the various fields in the woodworking industry.

In Step IV of the course the students will be allowed to make a personal choice project for themselves. They will make a rough sketch of the project and submit it to the instructor for approval. This part of the program will introduce the students to leisure time activities in woodworking as well as reinforce the skills in tool usage that they have learned up to this point.

Sample
12-week Syllabus

1	Feb 7	A. Introductions 1. Names students, teachers and aids 2. Shop and tools B. Discussion of Safety Rules 1. General shop conduct 2. Specific for tools C. Project - Bread Board 1. Pre-test 2. Develop use of back saw, mallet, sanding and oil finish
2	Feb 14	A. Safety Film 1. Primitive Pete (Give questions before start and discuss after) B. Projects - Mirrored Wall shelf - Book/Record Rack 1. Introduce new tools - compose saw brace and bit, coping saw and chisel 2. Further develop use of hand tool use and knowledge of materials
3	Feb 21	A. Time allotted for work on projects
4	Feb 28	A. Time allotted for completion of projects
5	Mar 7	A. Introduction of Mass Production 1. Explain item to be made - wheelchair tray 2. Safety rules on power machinery 3. "Dry Run" to develop better understanding of use of machines and flow of stock from station to station
6	Mar 14	A. Begin Mass Production process 1. Stock cutting and shipping
	March 28	SPRING BREAK
7	Apr 4	Mass Production - Assembly and Sanding
8	Apr 11	Mass Production - Prime and Paint
9	Apr 18	Mass Production - Completion
10	Apr 25	Free choice of projects - designed to expand the students' knowledge of the safe and proper use of hand tools, power tools, and planning procedures needed to construct their own projects
11	May 2	Free choice
12	May 9	Free choice

Course Outline

Introduction

A. Orientation
   1. Getting to know each other

B. Introduction to the shop

C. Safety Rules

Step I

Make bread board (Pretest)

A. Tools used
   1. backsaw
   2. mallet
   3. vise

B. Sanding

C. Finishing
   1. oil finish

Step II

Make mirrored wall shelf

A. Measuring

B. Tools used
   1. Metric rules
   2. Crosscut saw
   3. Rip saw
   4. Jack plane
   5. Files and rasps
   6. Screwdriver
   7. Coping saw
   8. Wood chisel
   9. Hand drill and bits
   10. Clamps
   11. Square

C. Sanding

D. Clamping

E. Gluing

F. Finishing
   1. Stain
   2. Varathane

Step III

A. Introduction to mass production techniques

B. Mass production project (Project undecided)

Step IV

A. Student choice of a project

Introduction

Objective:

While the students are in the shop area, the students will be expected to follow all of the safety rules listed on the following pages. The student will have completed the objective when he/she follows all of the safety rules while working in the shop. The student will say, write or show some form of his name to the class and tell or show one thing he/she likes to do.

Activities:

1. Introduce self and tell why you're here.
2. Tell some things about yourself that would help the class know you better.
3. Tour the shop.
4. Make a list of safety rules you think are important in woodworking.
5. Review the "26 Safety Rules" sheet and clarify any points that might demonstrate safety rules.
6. Practice safety rules by setting up examples and then following rules: (ex: shavings and wood pieces on floor, therefore clean up before beginning anything else).

26 Safety Rules

1. Place all handtools in an orderly arrangement on top of the bench, with all cutting edges pointed away from you.

2. Do not use broken or damaged tools. Report all defects to the instructor.

3. Make sure handles are securely fastened on planes, hammers, mallets, chisels, and files.

4. Use all tools properly and only for their intended purpose.

5. Fasten all materials to be worked on securely in a vise, or clamp them to the table top.

6. Put all scrap lumber and short pieces in their proper place.

7. Put all finishing and oily rags in covered metal containers.

8. Bending at the knees, use leg and arm muscles for heavy lifting. Never use your back muscles for heavy lifting.

9. Test the sharpness of cutting tools on paper or wood. Never use your hands to see if a tool is sharp.

10. Be careful when using your thumb as a tool guide.

11. Always direct the cutting action of knives away from your body.

12. Wear proper clothing in the wood shop.

13. Remove ties, roll up long sleeves, and remove all jewelry, when working in the wood shop.

14. Tie long hair back away from your eyes and out of the way of moving machinery.

15. Report all accidents immediately, no matter how minor.

16. Warn others when handling long lumber.

17. Never run in the shop area. Always walk carefully.

18. Use tools only with the approval of the teacher.

19. Do not play around in the shop area.

20. Do not talk and work at the same time.

21. Check to see that all tools are in good working condition before using them.

22. Always wear safety glasses in the shop area.

23. Keep all tools out of your pockets.

24. Carry all sharp and pointed tools with the sharp edges pointed down.

25. Clean up work areas when finished.

26. No smoking at any time while in the woodshop.

Step I: Bread Board

Terminal Objective:

At the completion of step I the students will be able to properly use a backsaw, mallet, and vise. They will also be able to sand and apply a non-toxic oil finish to their bread board. The students will demonstrate their understanding of the safety rules by correctly observing these rules at all times while working in the shop.

Performance Objectives:

Backsaw

Given a backsaw, a piece of wood, a C-clamp, and a jig the student will clamp the piece of wood in the jig and saw through it. The student has met the objective after he/she completes the following list of items:

a) clamps the wood in the jig,

b) picks the backsaw up,

c) places the saw in the jig properly,

d) draws the saw back across the wood enough times to start a saw kerf,

e) saws through the piece of wood.

Mallet

Given a mallet, a piece of wood with four holes bored into it, and four pieces of dowel rod the student will be able to pound the dowel rods into the wood. The student has met the objective after he/she has completed the following items:

a) picks up the mallet,

b) picks up the dowel,

c) gently taps the dowel until it is started in the hole,

d) pounds the dowel into the hole all of the way,

e) repeats steps b and c until all four dowels are in place.

Vise

Given a piece of wood and a vise the student will clamp the piece of wood in the vise and then remove it from the vise. The student has accomplished

the objective after completing the following items:

a) loosens the jaws on the vise,

b) picks up the piece of wood and places it in the jaws of the vise,

c) tightens the jaws of the vise until the wood is held securely,

d) loosens the jaws on the vise and removes the piece of wood,

e) tightens the jaws of the vise until they are touching each other.

Sanding Objective

Given a piece of sandpaper in each of the following grits, 100, 120, 180, and 220, a sanding block and a project that is ready to be sanded, the student will be able to sand the project, using the sandpaper in the proper order. The student has mastered the objective when he/she completes the following list of items:

a) clamps the project and sands all rough places with 100 grit sandpaper,

b) sands the entire project using 120, 180, and 220 grit sandpaper in that order;

c) uses the sanding block for flat surfaces.

Finishing Objective

Given a project needing a non-toxic oil finish, a bottle of vegetable oil, a finishing area, and a rag to apply finish, the student will be able to apply an oil finish. The student has completed the objective when he/she has completed the following list of items:

a) wipes off the project to remove all fine sanding dust,

b) opens the bottle of oil,

c) pours the oil onto the rag,

d) wipes the oil on the project, covering the entire surface,

e) puts the lid back on the bottle of oil,

f) throws the oily rag in a fireproof metal container.

Bread Board

Plan of Procedure

1. Place pre-cut board into fixture.
2. Cut off corner using guide cut in fixture. Repeat until all corners are cut off.
3. Holes may be drilled to place dowels for legs at each corner.

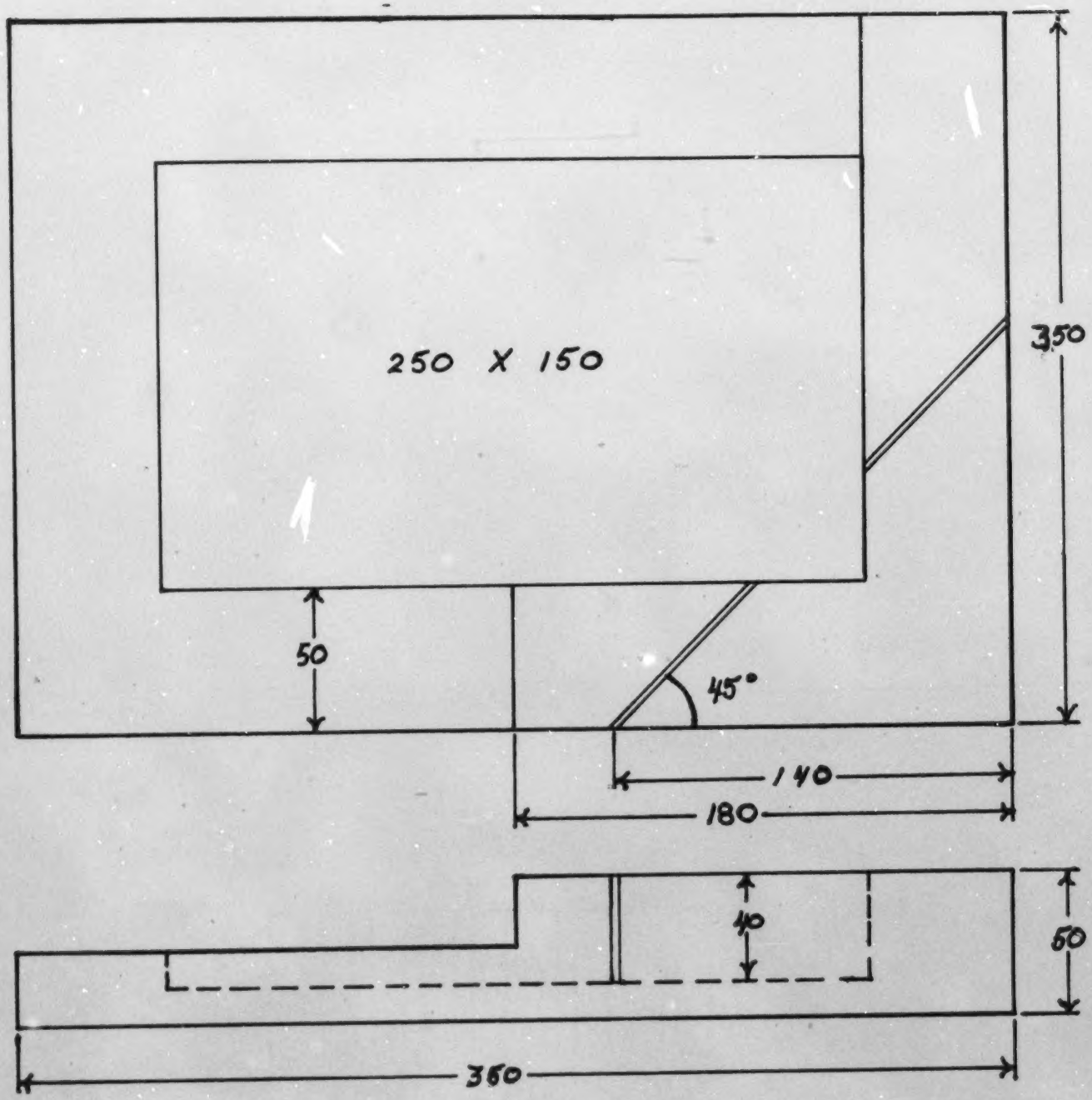
Materials Needed

1. Birch or maple 15 pcs cut into 250mm x 150 mm
2. Sand paper - 6 sheets 120, 6-220
3. 1 bottle of vegetable oil
4. 1/2 sheet of 1/2" or 3/4" plywood (fixtures)
5. 72" of 3/4" dowel rod
6. Glue

Tools

1. Back saws
2. Sanders
3. Mallets
4. Drill press (to be used by instructors)
5. Clamps or vises

BREAD BOARD FIXTURE
DIMENSIONS IN MM.



Step II: Mirrored Wall Shelf

Terminal Objective:

At the completion of step II the students should be able to safely and properly use the following hand tools: metric rule, crosscut saw, rip saw, coping saw, combination square, rasps, files, jack plane , wood chisel, hand drill, screw driver, and wood clamps. The students will also be able to properly assemble and glue a project together and how to apply a stain and a lacquer or varathane finish to their projects.

Performance Objectives:

Metric Measuring

Given a metric rule and a homework assignment with various length lines drawn on it, the student will be able to measure each line and record its length. The student has mastered the objective when he/she completes the homework assignment with 85% proficiency.

Cross-Cut saw

Given a cross-cut saw, a piece of wood with a line drawn across it, and a vise, the student will clamp the piece of wood in the vise and saw across the line. The student has met the objective after he/she completes the following list of items:

a) clamps the wood in the vise,

b) picks up the saw,

c) places the saw on the line,

d) draws the saw across the line enough times to start a saw kerf,

e) saws across the line.

Note:

The student will also be shown how to clamp a block of wood on the piece of wood to be cut, to serve as a guide when sawing.

Rip saw

Given a rip saw, a piece of wood with a line drawn down the length of the piece of wood, and a vise, the student will be able to clamp the wood in the vise and saw down the line. The student has met the objective after he/she completes the following list of items:

a) clamps the wood in the vise,

b) picks up the saw,

c) places the saw on the line,

d) draws the saw back across the line enough times to start a saw kerf,

e) cuts the board along the line.

Coping saw

Given a coping saw and a piece of wood with a design drawn on it, the student will be able to cut out the design. The student has accomplished the objective when he/she has completed the following list of items:

a) clamps the piece of wood to the bench top,

b) cuts around the line, staying on the outside of the line.

Objective for saws

Given a cross cut saw, a rip saw, a coping saw, and a hack saw, the student will be able to distinguish between each one of the saws and explain verbally what each saw is used for. The student has met the objective when he/she has demonstrated the following items:

a) student can point to each saw and correctly name it,

b) point to each saw and briefly explain what it is used for.

Note

If the student is non-verbal the instructor will read a description of each saw and ask the student to point to it. Also, given a specific saw the student will demonstrate correct usage of that saw through an activity.

Combination square

Given a combination square, a pencil, and a piece of wood with two irregular ends, the student will be able to square both ends of the piece of wood. The student has completed the objective when he/she has demonstrated the following:

a) places the square along one edge of the piece of wood,

b) picks up the pencil and draws a line across one end of the piece of wood,

c) places the square along the other end of the piece of wood,

d) picks up the pencil and draws a line across this end of the piece of wood.

Rasp

Given a rasp and a piece of wood with a contoured shape that has been cut with the coping saw, the student will use the rasp to round the edges. The objective is mastered when the students have completed the following list of items:

a) clamps the wood in the vise,

b) picks up the rasp,

c) rounds the edges of the piece of wood

File

Given a file and a piece of wood, the student will be able to remove all hand tool marks from the edge of the piece of wood. The student has completed the objective after he/she has completed the following list of items:

a) picks up the piece of wood and identifies which edge needs to be filed,

b) clamps the wood in a vise with the edge to be filed pointed up,

c) picks up the file,

d) files the piece of wood until all hand tool marks are gone.

Jack-plane

Given a jack-plane, a piece of wood, and a vise the student will be able to plane the edge of a piece of wood. The objective is mastered by the student when he/she completes the following items:

a) picks up the piece of wood and clamps it in the vise,

b) picks up the jack-plane and planes one edge of the piece of wood,

c) removes the wood from the vise.

Wood chisel

Given a wood chisel, a mallet, and a project that needs a dado cut into it, the student will be able to remove the wood with a wood chisel. The student has completed the objective when he/she has gone through the following steps:

a) clamps the wood to a bench securely,

b) picks up the chisel and mallet,

c) places the chisel on the wood and hits the end to remove wood. The student removes only a small amount of wood on each pass across the wood with the chisel,

d) makes enough passes across the wood to obtain the proper depth for the dado.

Note:

In previous steps the student has layed out the dado on the wood and has made the cuts on each side of the dado with a back-saw.

Hand drill

Given a hand drill, a chuck key, a drill bit, and a piece of wood the student will drill a hole in the piece of wood. The objective has been completed by the student after he/she has completed the following list of items.

a) picks up the piece of wood and clamps it securely in a vise,

b) picks up the hand drill and inserts the drill bit,

c) picks up the chuck key and tightens the bit in the drill,

d) drills a hole in the piece of wood,

e) removes the drill bit from the drill,

f) removes the wood from the vise.

Screwdriver

Given a screwdriver, two slotted-head wood screws, and two pieces of a project (shelf and back) that have pilot holes already drilled, the student will be able to fasten the shelf to the back. The student has accomplished the objective after he/she demonstrates the following procedure:

a) clamps the shelf in the vise,

b) places the back in the proper position over the shelf,

c) starts the screws in the pilot holes,

d) picks up the screwdriver and places it in the head of the screw,

e) completely screws the screws into the wood.

Note:

The student will be shown the difference between a slotted head and a phillips head screwdriver.

Clamps

Given two pieces of wood to be glued together edge-to-edge, three bar clamps, two c-clamps, several scrap pieces of wood to be placed between the clamps and the wood to be clamped the student will be able to clamp the two pieces edge-to-edge. The student has mastered the objective after he/she completes the following steps:

a) places the clamps on the clamping stand,

b) places the two pieces of wood to be clamped together between the clamps,

c) places the scrap pieces of wood between the clamps and the surface to be clamped,

d) tightens the clamps until the two edges meet,

e) places the c-clamps on each end to make the surface flush on each side,

f) finishes tightening the bar clamps.

Given a hand-screw clamp and a piece of wood the student will be able to clamp the piece of wood to a bench top. The student has completed the objective when he/she completes the following items:

a) lays the piece of wood on the bench top,

b) picks up the hand screw clamp and opens the jaws,

c) places the clamp over the wood and under the bench top,

d) tightens the clamp until the wood is securely fastened to the table top,

e) loosens the clamp and removes the wood.

Gluing

Given a project ready for assembly, a gluing table, glue, enough clamps

to clamp the project together, and a wet rag or paper towel the student will be able to apply glue to all of the joints and clamp the project together until the glue is dry. The student has completed the objective when he/she has completed the following steps:

a) makes a trail assembly to see that everything fits together,

b) takes the trail assembly apart and puts glue on all the the joints that will be glued together,

c) spreads the glue evenly over all of the joints,

d) puts the project back together and clamps it securely together,

e) wipes off all of the excess glue with a wet rag or paper towel,

f) puts the glue away,

g) allows the glue to dry and then removes the clamps.

Finishing Objectives

Staining

Given a project ready to be stained, a paint brush, a can of stain, a stirring stick, an opener, and some rags the student will be able to apply the stain to the project. The student has completed the objective when he/she has gone through the following steps:

a) removes all of the fine sanding dust from the project,

b) opens the can of stain,

c) stirs the can of stain,

d) dips 1/3 of the brush into the stain,

e) applies the stain to the project by brushing it on,

f) wipes off the excess stain with a rag,

g) puts the lid back on the stain securely,

h) cleans out the brush,

i) throws all of the oily rags into a fireproof metal container.

Varathane or Paint

Given a project ready for a protective finish, a can of varathane or

paint, a stirring stick, a paint brush, and an opener the student will be able to apply a finish to the project. The student has completed the objective when he/she has gone through the following steps:

a) wipes off all of the dust on the project,

b) opens the can of finish,

c) stirs the finish with a stirring stick,

d) dips 1/3 of the brush into the finish,

e) brushes the finish onto the project until the entire project is finished,

f) puts the lid on the finish,

g) cleans out the brush.

WOODWORKING I

Measuring Homework

Measure these lines to nearest cm

1.

2.

3.

Measure these lines to nearest mm

1.

2.

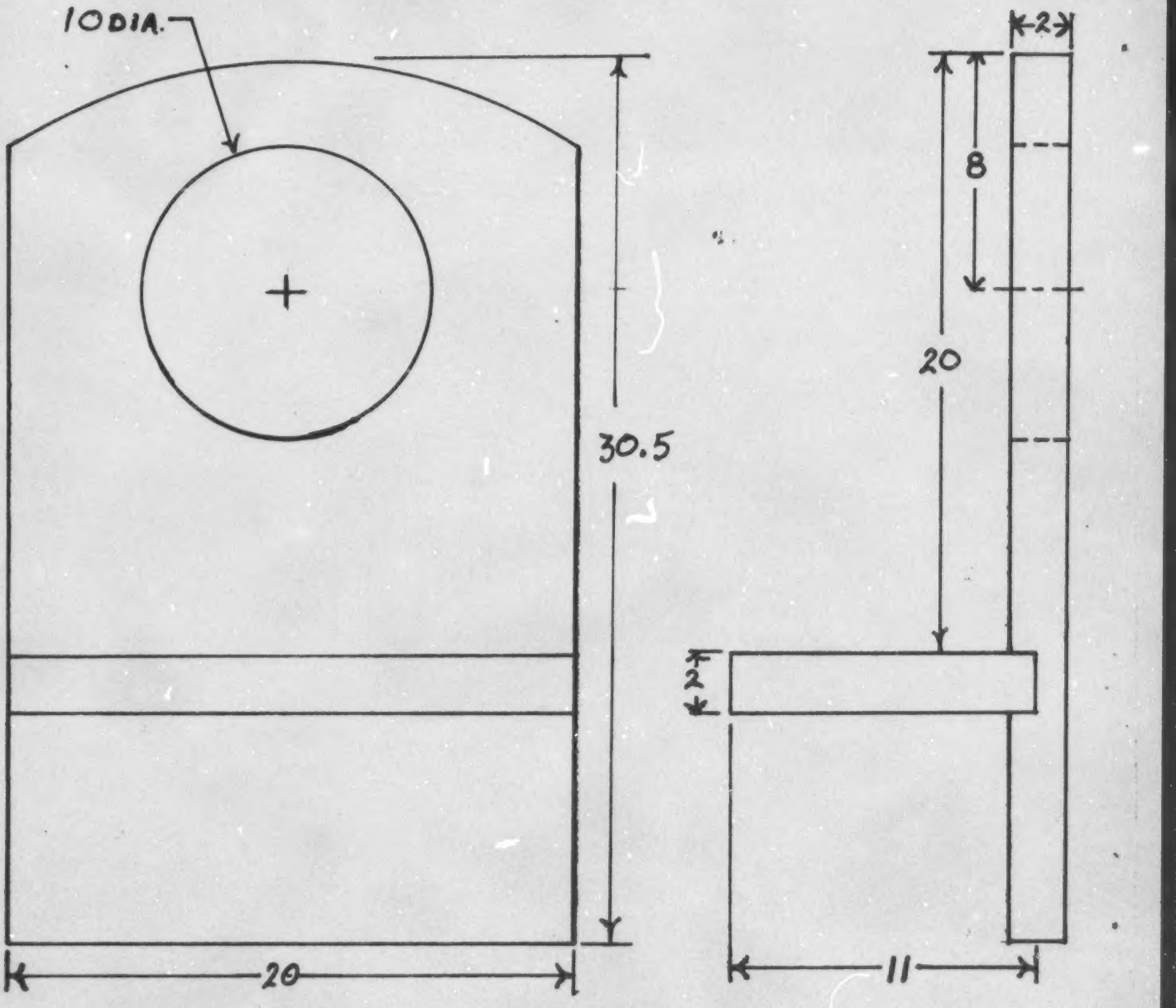
3.

WOODWORKING I

Mirrored Wall Shelf
Plan of Procedure

	Tool Needed
1. Mark and cut	
a. Center hole	cross cut saw
b. Rounded top	coping saw
c. Shelf	drill (to start center hole)
2. Cut Kerf for shelf joint	back saw - mitre box
3. Chisel out groove for shelf joint	mallet - chisel
4. Sand all parts	sand paper
5. Fit and glue shelf	sand paper - file - glue - clamps
6. Attach mirror to back	corner holders

MIRRORED WALL SHELF
DIMENSIONS IN CM.



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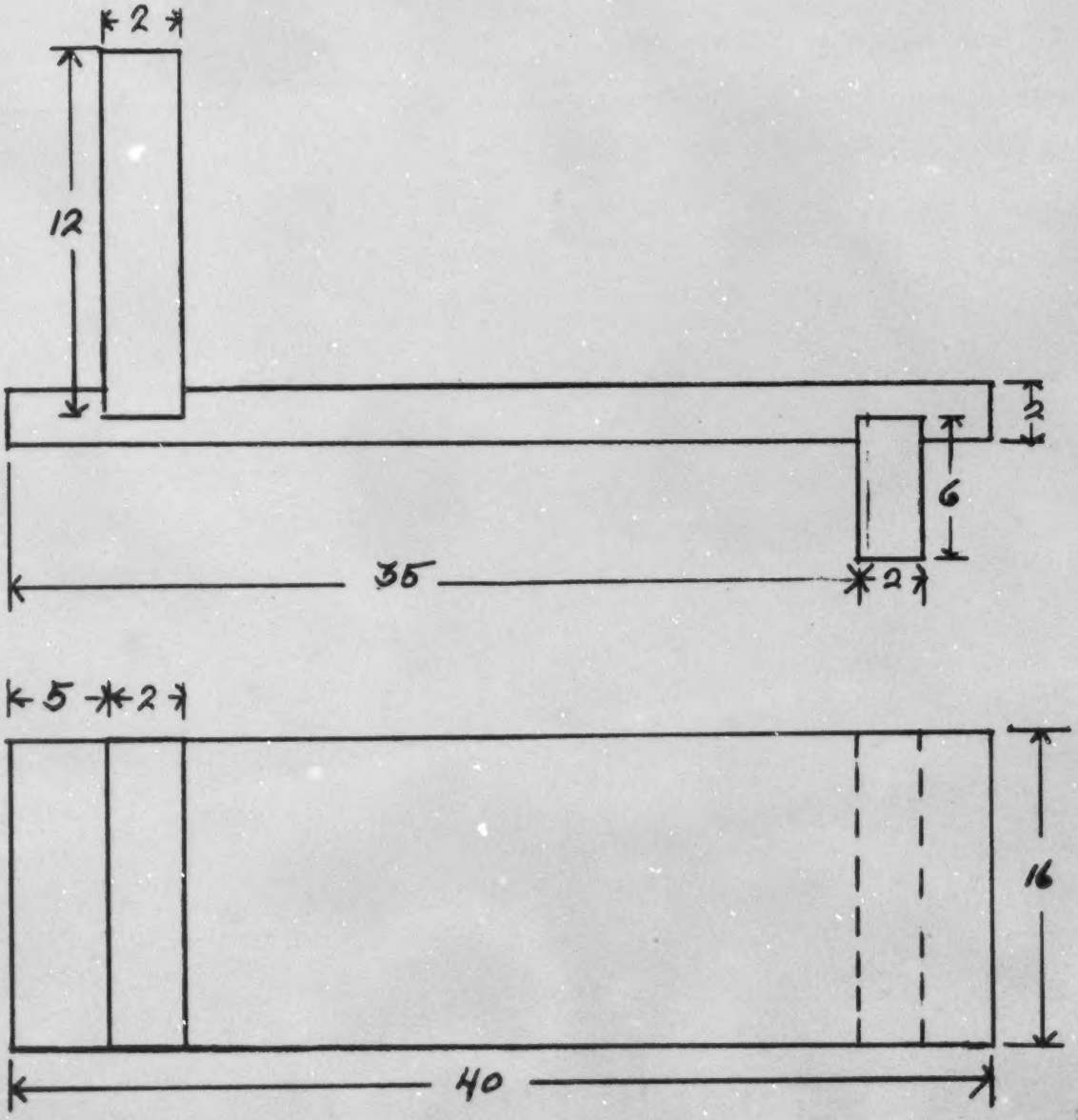
WOODWORKING I

Book-Record Rack
Plan of Procedure

1. Cut pieces to length - cross cut saw
   a. leg
   b. back
   c. base
2. Sand all parts - sand paper
3. Cut groove for joints - back saw
4. Chisel waste wood for joints - mallet and chisel
5. Fit and glue parts - glue and clamps
6. Apply finish

BOOK - RECORD RACK
DIMENSIONS IN CM.



Step III: Mass Production

Terminal Objective:

After the completion of Step III the students should be able to understand the concept of mass-production and be able to name at least three jobs relating to the field of woodworking.

Performance Objectives:

Given a field trip or a guest from the field of woodworking the student will be able to explain orally at least three jobs in the field of woodworking. The student will also be able to discuss the importance of mass production in manufacturing.

Given a project to be mass produced by the class the students will be able to work together in a safe and orderly manner to complete this project.

Activities:

1) Field trip to a woodshop
2) Guest speaker: woodworker
3) Mass production line in the shop

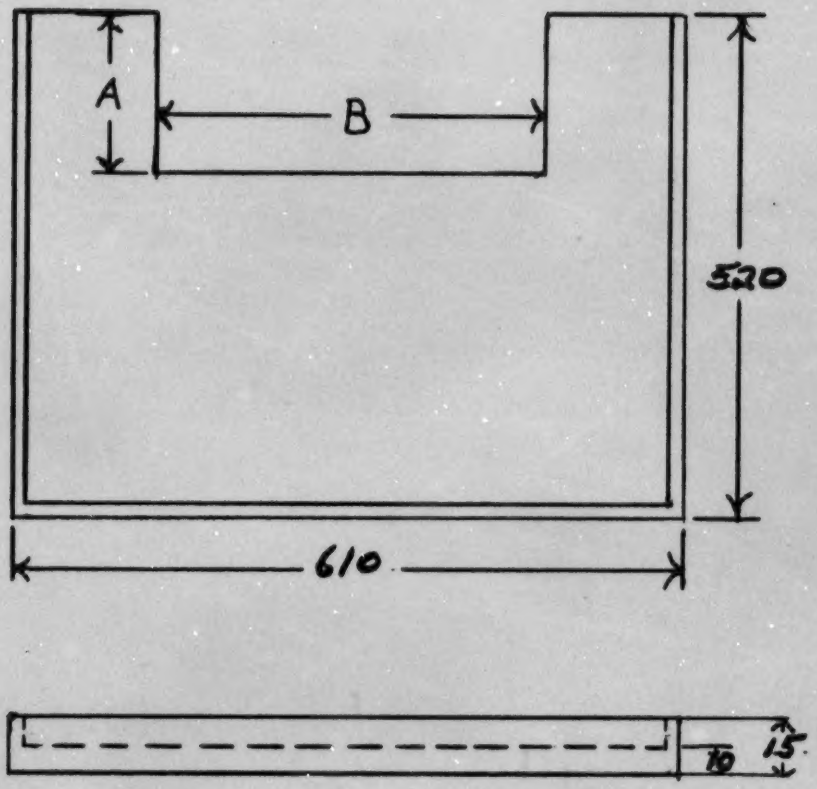
Mass Production

The Mass Production step is to give the student a better understanding of the process involved in mass producing an item. This will be accomplished by dividing the class into groups and assigning each group one of the following work stations (Example item: wheel chair tray).

1. Cut stock into pieces - vertical power saw
2. Cut tray shape - band saw
3. Rough sand tray - pneumatic sander
4. Cut molding - mitre box - radial arm
5. Assemble tray - nail and hammer
6. Finish sand - paint - brush

With the students working at one or more of these work stations, or part of the team, a better knowledge of tools and a better understanding of process will be the result.

WHEELCHAIR TRAYS
DIMENSIONS IN MM.



TINY TOT	A = 150 B = 285
JUNIOR AND ADULT	A = 200 B = 360

Step IV: Personal Project

Terminal Objective:

At the end of Step IV the students should be able to make rough drawings of a project to be made, and be able to use these drawings to complete the project.

If there is enough time the students will be allowed to make something of specific interest to them.

Activities:

1) Choose one activity that is of interest to you.
2) Make plans for accomplishing a finished product.
3) Plan a time line for reaching the completion of your project.
4) Obtain materials needed for your special project.